

Patient Health Information System for Discharge Planning in Nursing Services in Hospitals

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ABSTRACT

This research aims to develop a patient health information system application for discharge planning, and to test its effectiveness based on the success of discharge planning for patient care. The research and development method employed three main stages, namely, (1) analysis of the information system requirements, (2) the development of the health information system, and (3) creating a discharge planning health information system trial. This study involved nurse participants and 132 patients selected by simple random sampling. Data was collected by interviews, focus group discussions and questionnaires, which assessed the use of the Android-based discharge planning health information system application. The success of discharge planning was measured by the level of compliance in five of discharge planning, which included taking medication planning, treatment, health education, diet and re-control. The results of a statistical T-test showed that the health information system application was proven to be more effective than the traditional (manual) discharge planning system. This was evidenced by all the variables measured in discharge planning, including taking medication planning ($p = 0.000$), treatment planning ($p = 0.000$), health education planning ($p = 0.000$), diet planning ($p = 0.000$) and re-control planning ($p = 0.000$). Therefore, the health information system has proven to be highly reliable in comparison with the conventional manual discharge planning system, in planning for patients to be discharged to their homes.

Keywords: Information Systems, Discharge Planning, Nursing, Technology

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INTRODUCTION

Health problems are highly complex and can be experienced by every human being. These problems are always related to other secondary problems. Among the health problems that are generally experienced by patients is ignorance of the symptoms of the disease, and delays in asking for help from health services. This is due to lack of awareness and behaviour. This condition can be experienced by patients after being hospitalized, primarily due to the ineffective implementation of discharge planning in hospitals. The main problem is that there remain many discharge planning events at hospitals in a sufficient category (83.24%)^{1,2}.

One of the effects of discharge planning is that it is ineffective and causes a low level of compliance for control by the hospital. This is in line with Suryadi's research (2013), who states that 70.6% of patients do not comply because nurses do not do a good job as educators in discharge planning. The problem of ineffective discharge planning is closely related to information and communication with patients, including the poorly designed information system at the hospital.³

For this reason, the use of information technology is important and effective for the implementation of discharge planning for nurses at hospitals. However, the use of information systems from the patient's perspective has not been developed. This has brought up the motivation to propose and develop a patient health information system for discharge planning, which can

used by patients at the hospital and after being treated by the hospital.⁴⁻⁷

METHOD

This study was undertaken during 1 March 2018 to September 2020. During the first year, an analysis of information system requirements was carried out. In the second year, the design of an Android-based health information system was developed. In the third year, a discharge planning health information system trial was carried out. The stages of software development involved the waterfall model in information systems development. The steps of analysis were design, coding, and testing.

The participants consisted of nurses and 132 patients. The inclusion criteria were patients requiring post-hospital care, a medical diagnosis of covid-19, Cerebra Vascular Accident (CVA), diabetes mellitus, hypertension, kidney failure, post-partum, pulmonary tuberculosis, and bronchial asthma, with an age of over 20 years. The sampling technique used simple random sampling.

The data was collected through interviews, focus group discussions and questionnaires by assessing the use of discharge planning health information system application with 10 questions, with indicators of information system application objectives, ease (accessibility), facilities in information systems, benefits in monitoring patient health status. The Cronbach's Alpha value was 0.807.

This research received approval from the Ethical Review Board (ERB) Committee of the Muhammadiyah University of Surabaya, Surabaya, Indonesia (ERB No.

611/2020). The research participation consent form included a statement that participants can cancel their participation at any time, data collected will only be used for the purpose of research, and participant anonymity will always be enforced. Participants gave their consent voluntarily after a thorough explanation. The data analysis used content analysis to analyse the qualitative data collected from in-depth interviews and descriptive analysis to analyse the description of patients'

health information needs. Inferential analysis was also used to analyse the difference between the patient health information system group, and the control group, using a t-test with a threshold of $p < 0.05$.

RESULTS

Figure 1-2 depicts the results of developing a health information system for discharge planning in hospital services.

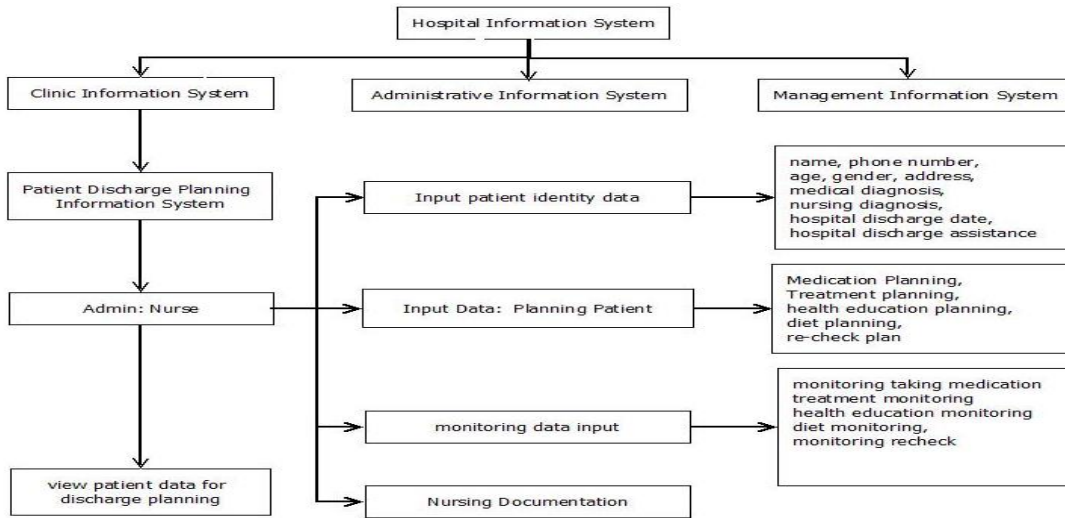


Figure 1. Health Information System for Discharge Planning Patients

The 'Health Information System for Discharge Planning Patients in Nursing Services in Hospitals' can be accessed at <http://eduners.com/discharge-planning/>. In this information system, categories include patient identity data, patient planning data, post-treatment patient monitoring data from the hospital and nursing documentation. In the management of information system, there are three types of users, namely, hospital administrators, nurses and patients (Figure 2). The hospital administration acts on behalf of the hospital management, which has the role of integrating patient identity data input. The nurses have a role in setting the patient input menu in discharge planning. The patient monitoring and documentation is a form of legal aspects (Figure 3). Patients as users can view patient planning data during home care and monitor the progress of their status at home when returning to the hospital.

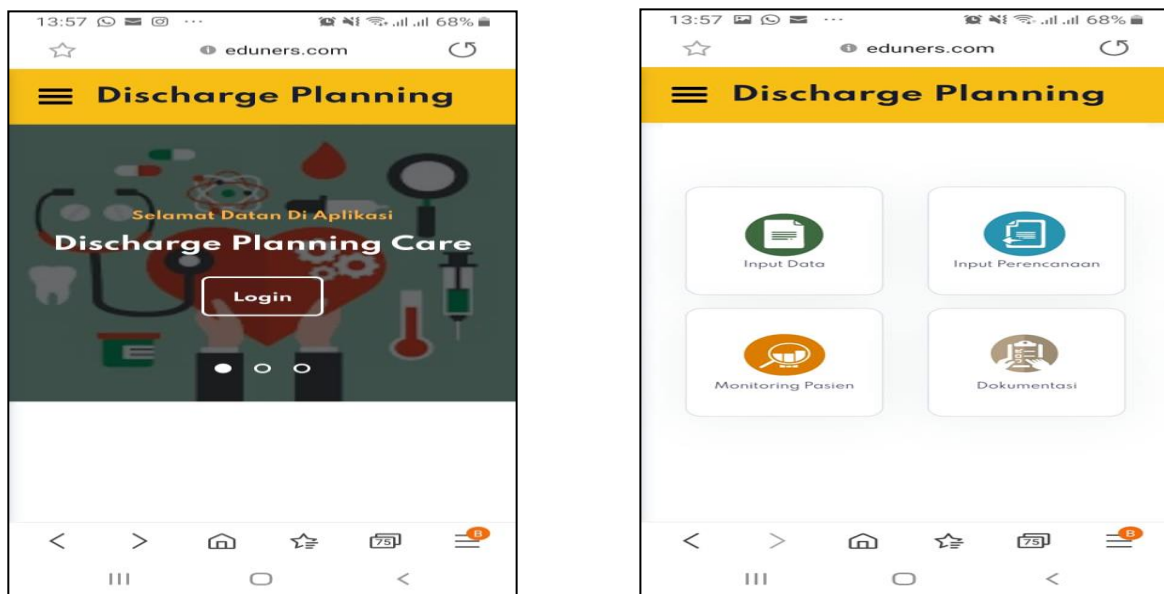


Figure 2. Display of Login and Menu of Patient Health Information System for Discharge Planning

Table 2. The socio-demographic characteristics of patient respondents who were treated at Muhammadiyah hospital in Surabaya (Sidoarjo and Lamongan, 2020)

Characteristics	Discharge Planning with Information System		Discharge Planning with Traditional system	
	N	%	N	%
Gender				
- Female	35	47.0	34	51.5
- Male	31	53.0	32	48.5
Marital Status				
- Single	14	21.2	12	18.2
- Married	52	78.8	54	81.8
Level of Education				
- Junior high school	12	18.2	11	16.7
- Senior high school	32	48.5	34	51.5
- Higher education	22	33.3	21	31.8
Employment status				
- Unemployed	10	15.2	9	13.6
- Employed	56	84.8	57	86.4
Medical Diagnosis				
Covid-19	16	24.2	14	21.2
CVA	4	6.1	6	9.1
Diabetes Mellitus	7	10.6	9	13.6
Hypertension	12	18.2	10	15.2
Renal Failure	0	0.0	3	4.5
Post-Partum	20	30.3	17	25.8
Pulmonary TB	4	6.1	3	4.5
Bronchial Asthma	3	4.5	4	6.1
	Mean	SD	Mean	SD
Age	45.1	13.58	45.7	13.21

Table 2. shows the results of testing the effectiveness of using the proposed patient health information system for discharge planning in hospitals, between the control group and the experimental group.

Variable Discharge Planning	Group				P Value
	Discharge Planning with Health Information Systems (experiment group)		Discharge Planning with Traditional (manual) (control group)		
	Mean	SD	Mean	SD	
Planning of Drink Drugs	0.240	0.422	2.227	3.939	0.000
Planning of Treatment	0.240	0.345	1.136	3.939	0.000
Planning of Health Educatin	0.209	0.456	2.287	3.954	0.000
Planning of Diet	0.209	0.540	1.984	3.954	0.000
Re-Planning of Control	0.266	0.484	1.363	3.924	0.000

DISCUSSION

The results of testing demonstrate that using the health information system model for discharge planning in nursing services was proven to be more effective as compared to outdated, traditional (manual) discharge planning system at the hospital considered. The results of the statistical t-test on all variables measured in

discharge planning included planning of consuming medicine (p = 0.000), planning of treatment (p = 0.000), planning of health education (p = 0.000), planning of diet (p = 0.000) and re- planning of control (p = 0.000). Based on this, the use of the health information system model was highly effective for the current conditions, because the system comprises useful features in its application

framework. The users can use and move from available components. Dalvik virtual machines optimized for mobile devices, 2D graphics and 3D graphics based on the open GL library were used. SQLite was used for data storage. There were media support facilities included such as audio, video in various image formats, data communication such as GSM, Bluetooth, EDGE3 G and WIFI, a camera, a global positioning system (GPS) compass and accelerator meter. The android application development environment included emulator, debugging tools and plugins for clips IDE ^{8,9}

The patient health information system can be easily implemented, since the principle of information systems is that the data was processed into a form that is more useful and meaningful for those who receive it. Therefore, the data accessibility was presented in a timely and accurate manner, and according to user data needs.

Discharge planning was part of the continuous care system, where the client needs help with ongoing care. This can also help the family find solutions to problems properly, at the right time and from the right source. Discharge planning has the goal of helping clients and their families achieve a healthy level. A discharge plan starts when the patient is admitted to the hospital and continues even when the patient is discharged back home. Discharge planning also has the goal of reducing the recurrence rate and return to the hospital, and understanding the patient's needs by nurse remotely.¹⁰⁻¹⁵ Discharge planning was carried out through various stages, including the assessment covering the collection and organization of data about clients. This data included health data, personal data, care givers, environment, finance and services supporting patients. Further diagnosis and planning will help patients achieve the expected results. According to Luverne and Barbara, patient discharge planning requires the identification of a client's specific needs, which includes the need for drugs that must be continued after returning home from the hospital. The environment should be safe with the required service facilities, medication, health education, system of support for health care providers, diet, and finally, discharge planning activities from the implementation and evaluation of patients ^{2, 16, 17}

The failure of discharge planning in the patient when the patient had returned home because the discharge planning program was often difficult for the patient to know and access. Therefore, the patients need an information system that was easy, fast and accurate. Through the patient health information system, it can be easy for patients to get home planning information via Android, as well as health workers or health services can monitor patient development, so that discharge planning objectives can be achieved as the discharge planning concept in nursing services ^{1, 18-20}

The results show that the research was in accordance with results by prior work, including research by Chang *et al.* (2004), which states that a case-based information system was sustainable in assisting patient discharge planning, and assisting staff in formulating accurate action plans based on previous case assessment experience. Through the implementation of the system, the accumulated knowledge and experience of the continuous care model can help staff evaluate the discharge planning process to achieve treatment procedures ²¹. The study by Bikmoradi *et al.* stated that the use of technology through Tele-Nursing has had an impact on adherence to treatment plans in patients who were discharged after coronary artery bypass graft ²².

Based on these two studies, it was clear that the use of information technology in nursing services was very much needed in improving the overall quality of nursing services, including planning for patients to go home.

CONCLUSION

This research proposed and developed a patient information system model for discharge planning in nursing services. The effectiveness of using the health information system was tested, especially for medical diagnoses that required post-hospital care. The results indicate that the patient information system was highly reliable and effective when applied in all forms of nursing services for patients. The results produced in this research are promising, and merit further research on how the developed system can be integrated to other hospitals across the country.

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CONFLICT OF INTEREST

The authors have no conflicts of interests to declare.

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